Informal Guidance for DWR Grantees: GHG Assessment for CEQA Purposes

Introduction and Use of this Document

The Department of Water Resources' ("DWR") grant programs assist local agencies finance a wide array of water resource planning and implementation projects each year. Many of these projects are considered projects as defined under the California Environmental Quality Act[1] ("CEQA") and thus project sponsors are required to prepare and circulate an environmental document prior to final funding approval by DWR. As a grantor, DWR acts as a responsible agency under CEQA and makes its own findings on the potential environmental impacts of the proposed project. As a responsible agency, DWR relies on the analysis completed by the lead CEQA agency as the basis for making its findings.

The analysis of greenhouse gas (GHG) emissions was added to the CEQA Guidelines by the Natural Resources Agency on December 30, 2009, and became effective March 18, 2010. GHG emission analysis is a new field of analysis with which many grantees may be unfamiliar. This document is being provided as a reference tool only for project proponents receiving funding from DWR.

This document describes DWR's analysis and interpretation procedure for complying with the CEQA Guidelines amendments when it acts as a lead agency under CEQA. In an effort to assist project proponents in developing and disclosing GHG emissions information, DWR is providing this document as an informative tool to describe what it is doing for its own review. This guidance document, however, is not provided as a requirement, rule or standard of general application.

As a responsible agency, DWR will use the information provided by the lead agency to review proposed projects and to reach independent findings with respect to potential effects of GHG emissions (and other impacts) from the project.

Background

Global climate change is becoming an increasingly important and challenging part of the CEQA analysis. CEQA generally requires public agencies to review the environmental impacts of proposed projects, and, if those impacts are determined to be significant, to consider feasible alternatives and mitigation measures that would substantially reduce significant adverse environmental effects. In 2007, the California Legislature recognized the need for guidance on the analysis of climate change for CEQA compliance, and with SB 97, directed the Natural

[1] The California Environmental Quality Act ("CEQA") is codified at Public Resources Code, §21000, *et seq*. The Guidelines for the Implementation of CEQA ("CEQA Guidelines") are found at title 14 of the California Code of Regulations, §15000, *et seq*.

Resources Agency, in coordination with the Governor's Office of Planning and Research, to address the issues through amendments to the CEQA Guidelines. As a result of SB 97[2], new CEQA Guideline amendments provide direction to lead agencies about evaluating, quantifying, and mitigating a project's potential GHG emissions. The new regulations are viewable at: http://www.ceres.ca.gov/ceqa/guidelines/ and have also been codified under title 14 of the California Code of Regulations.

This document provides DWR's interpretation of the CEQA Guidelines and how it internally calculates GHGs for CEQA purposes. Some CEQA projects may also require an analysis of the potential impacts of expected climate change on the project. At their own discretion, project proponents are encouraged to research and develop their own methodologies for determining if a climate change analysis needs to be done and how to complete that analysis.

Adequate consideration of the effects of climate change is challenging due to the spatial and temporal scales upon which changes occur. In addition, scientific understanding of the effects of GHG accumulation in the atmosphere is evolving rapidly.

As a responsible agency under CEQA, DWR must evaluate the impact of climate change-causing GHG emissions for a proposed project in exercising its discretion to give final approval for a grant. The GHG assessment must be consistent with CEQA Guidelines section 15064.4 (Determining the Significance of Green House Gas Emissions). As required under CEQA, DWR will evaluate the adequacy of the lead agency's determination and exercise its independent judgment in deciding whether or not to give final approval for a grant.

IRWM implementation projects will generate GHG emissions during project construction and operation. Many IRWM projects, however, when compared to a current baseline, may generate or account for relatively low or even negative GHG emissions during their operation. Examples include water meter installations, wastewater reuse projects, and local groundwater recharge projects to reduce need for imported water. In either case, CEQA requires an accounting of the GHG emissions from a proposed project be included in the CEQA document.

Accounting for GHG Sources

The principal GHGs associated with anthropogenic emissions are carbon dioxide (CO_2), methane (CH_4), nitrous oxide (N_2O), sulfur hexafluoride (SF_6), perfluorocarbons (PFC), and hydrofluorocarbons (HFC). (Kyoto Protocol and Health & Saf. Code, § 38505, subd. (g). See also, CEQA Guidelines, § 15364.5) Each of the principal GHGs has a long atmospheric lifetime (one year to several thousand years). In addition, the potential heat trapping ability of each of these gases varies significantly from one another. CH_4 for instance, is 23 times more potent than CO_2, while SF_6 is 22,200 times more potent than CO_2 (IPCC AR3, 2001). Conventionally, GHGs have been reported as carbon dioxide equivalents (CO_2e). CO_2e takes into account the relative potency of non-CO_2 GHGs and converts their quantities to an equivalent amount of CO_2 so that all emissions can be reported as a single quantity.

[2] Senate Bill 97, Chapter 185, Statutes of 2007, codified at Pub. Resources Code, § 21083.05.

The primary man-made processes that release these GHGs include: 1) CO_2 emissions from burning of fossil fuels for transportation, heating and electricity generation; 2) agricultural practices that release CH_4, such as from enteric fermentation in ruminant livestock, crop residue decomposition, and manure lagoons, or of N_2O from nitrogen fertilizer use; 3) waste management, such as from landfills and anaerobic digestion of liquid wastes; and 4) industrial processes that release smaller amounts of high global warming potential gases, such as SF_6, PFCs, and HFCs. Deforestation and land cover conversion have also been identified as contributing to global warming by reducing the Earth's capacity to remove CO_2 from the air and altering the Earth's albedo or surface reflectance, allowing more solar radiation to be absorbed.

Many recent documents provide information about accounting for GHG sources. Appendix B is a list of technical references that can assist project proponents in analyzing GHG emissions from their projects. These references are specifically chosen for their relevance to CEQA; however, many other good references exist.

In general, GHG sources can be accounted for either qualitatively or quantitatively. DWR interprets the CEQA Guidelines to require quantification of GHG emissions to the extent possible. In cases where lack of scientific understanding or data availability precludes a quantitative analysis, other methods of accounting for GHG emissions described under CEQA Guidelines § Section 15064.4 could be employed. This can be addressed by providing additional information on the current state of scientific understanding regarding the emission source, ongoing research, and if available, potential ranges for emission or sequestration potential.

Developing an Inventory and Calculating GHG Emissions

Establishing project boundaries for CEQA purposes

The first step in establishing a project level emissions inventory is to define a project boundary. The boundary delimits the extent of the project as defined under CEQA. (Pub. Resources Code, § 21065.) All emissions within the boundary are attributable to the project while emissions outside of it are attributable to some other source. Project proponents should give careful consideration to project boundaries so that all emissions attributable to the project are included. Several methodologies for calculating GHG emissions have been developed by various entities and for various purposes. A well known and widely used methodology has been developed by the World Resources Institute (WRI) and World Business Counsel for Sustainable Development. This methodology was adapted by the California Climate Action Registry (CCAR) now known as The Climate Registry (TCR) and is being used throughout North America as a consistent and transparent standard to calculate, verify and publicly report greenhouse gas emissions. Methodologies like the WRI/CCAR/TCR have been developed for inventories of individual entities (companies, agencies, or organizations) not "projects" as defined by CEQA. Thus, additional emissions, not calculated using a methodology like WRI/CCAR/TCR, may need to be included to complete the analysis for CEQA purposes. Below is an example of how the WRI/CCAR methodology excludes emissions that would need to be included in a CEQA analysis.

DHL, a large international shipping company, outsources much of the long-distance shipping of packages required for its business operations. Under the WRI/CCAR/TCR protocol, the emissions generated by the outsourced activities would be considered indirect emissions that are only optionally reported.

This convention circumscribes a boundary that is likely too restrictive to capture the broad range of effects and impacts needed for a CEQA analysis. CEQA defines a "Project" as "an activity which may cause either a direct physical change in the environment, or a reasonably foreseeable indirect physical change in the environment…undertaken by a person which is supported, in whole or in part through contracts, grants, subsidies, loans… from one or more public agencies." (Pub. Resources Code, § 21065.) This definition of a project is broader than the definition of an entity used by WRI/CCAR. Thus, DWR interprets this to mean that careful consideration of the project boundaries for CEQA purposes should be made when employing the CCAR/WRI protocol or an emissions model to calculate project GHG emissions.

Appendix A. provides an excerpt from DWR's internal guidance for analyzing GHG emissions for CEQA purposes. The appendix provides additional specificity on DWR's internal policy for establishing project boundaries and determining what emissions sources to include in CEQA analyses.

Based on DWR's own analysis of CEQA practice and consultation with experts in the field, DWR has established the following protocol for establishing project boundaries for its own projects. This information is provided to assist project proponents with their own analysis. DWR is not mandating that this protocol be used by project proponents. However, project proponents should be made aware that the GHG analysis will be used by DWR to support its own CEQA findings for the project when it considers funding the project as responsible agency.

References

California Air Resources Board. 2007 *OFFROAD2007.* http://www.arb.ca.gov/msei/offroad/offroad.htm

California Attorney General's Office. 2009. *Comment letters filed under the California Environmental Quality Act*. Retrieved July 16, 2009, from California Attorney General's Office Web site: http://ag.ca.gov/globalwarming/ceqa/comments.php

California Climate Action Registry. 2009. *General Reporting Protocol Version 3.1.*

Caterpillar. 2008. *Caterpillar Performance Handbook Edition 38.*

Intergovernmental Panel on Climate Change. 2006. Guidelines for National Greenhouse Gas Inventories. Arlington, Virginia: Institute for Global Environmental Strategies.

United States Environmental Protection Agency. 2009. *Inventory of U.S. Greenhouse Gas Emissions and Sinks 1990-2007.* Washington, D.C.: Environmental Protection Agency.

World Resources Institute and World Business Council For Sustainable Development. N.d. *The Greenhouse Gas Protocol for Project Accounting.*

Appendix A. Excerpt of DWR Internal Guidance on Analyzing GHG Emissions for CEQA Purposes

DWR's environmental documents should establish project boundaries that include the transportation of all materials, labor, and energy required to construct, operate and maintain the project. This typically means placing the boundary of the project for materials at the loading docks of each material supplier. For labor, this would include transportation from the nearest city or town expected to provide workers for construction, operation, and maintenance. For energy this includes all emissions associated with energy supplied from any source.

This boundary convention does not account for the emissions attributable to the manufacture of materials or equipment used by the project. Many projects require the use of large quantities of cement, steel, and other manufactured materials that may be a substantial source of GHG emissions. For example, cement production requires a large amount of energy and results in large CO_2 emissions per ton of cement produced. Including these emissions would be more indicative of a "life-cycle" emissions analysis. To date, no court has ruled that such an inclusive analysis is required to meet the requirements of CEQA.

Methodologies to use in estimating project emissions

A number of methodologies have been published providing guidance on inventorying and quantifying GHG emissions such as those from the United Nations Intergovernmental Panel on Climate Change (IPCC) or the World Resources Institute (WRI). The IPCC has published guidelines for national greenhouse gas inventories (IPCC, 2006), which the U.S. Environmental Protection Agency (EPA) has used to develop an inventory for the United States (EPA, 2009). The California Air Resources Board (CARB) also developed an inventory of GHG emissions for California using these guidelines. These inventories provide important information about the scale of national and statewide emissions. However, the methods used to complete them vary significantly from the methods needed to complete a project-level inventory.

For project-level GHG emissions assessments a more appropriate emissions reporting protocol has been developed by the WRI in cooperation with the World Business Council for Sustainable Development (WRI and WBCSD, n.d). This protocol was used as the basis for the California Climate Action Registry (CCAR) (CCAR, 2009). The WRI and CCAR emissions reporting protocols establish guidelines for voluntary accounting of GHG emissions:
http://www.ghgprotocol.org/standards/project-protocol;
http://www.climateregistry.org/tools/protocols/general-reporting-protocol.html
They provide a peer-reviewed and widely accepted methodology for calculating GHG emissions. WRI has also published several calculation tools to simplify and document the procedure. In general, the protocols outline how to estimate emissions from mobile combustion sources, electricity consumption, and industrial processes. The protocol output provides an analysis of all six GHG's as defined by the Kyoto Protocol and California state law (Health &Safety Code, §38505(g)): carbon dioxide (CO_2), methane (CH_4), nitrous oxide (N_2O), sulfur hexafluoride (SF_6), hydro fluorocarbons (HFC's), and perfluorocarbons (PFC's). Emissions are converted to CO_2 equivalents, the common unit for reporting of GHG.

A number of emissions models are available for calculating a wide range of air pollutants. One such model, the Urban Emissions (URBEMIS) model, developed by Environmental Management Software, is one of the most commonly used mobile emissions calculation models and uses the California Air Resources Control Board's (CARB) Emfac2007 and Offroad2007 models within its code. It should be noted that URBEMIS and many other emissions models do not calculate emissions from non-CO_2 GHGs. Therefore, projects that have quantifiable emissions of GHGs other than CO_2 should consider using models or other methodologies that capture all important GHG emissions.

The Natural Resource Agency has adopted CEQA Guidelines that address the quantification of GHG emissions. CEQA Guidelines Section 15064.4, subd. (a)(1) states that a lead agency has discretion to determine whether to "use a model or methodology to quantify greenhouse gas emissions resulting from a project, and which model or methodology to use." The WRI/CCAR protocol, URBEMIS, or other similar models may be appropriate choices for analysis of GHG emissions for projects receiving funding under DWR grant programs. Under the CEQA Guidelines, substantial evidence supporting the use of a specific model or methodology is required.

Specific construction and operation considerations

- Operation of construction equipment: To complete the emissions inventory for the project, construction estimators should provide approximate numbers and types of construction equipment required and the estimated number of days and hours each piece of equipment will be used. Technical reference materials such as the Caterpillar Performance Handbook, Offroad 2007 (ARB, 2007) and industry experts such as equipment contractors and construction estimators can provide fuel consumption rates for construction equipment. Models may use assumed values for fuel consumption of common construction equipment; these assumed values should be checked to ensure that emissions are not being systematically over or under calculated.

- Emissions associated with trucking construction equipment to the project site: Each project should set a reasonable trucking distance within which all equipment could be acquired, then apply this assumed average travel distance to each piece of equipment to be trucked to the project.

- Labor Force: As with construction equipment, the labor force needed to construct projects may exceed the available local workforce. Or construction sites may be located in relatively remote areas many miles from existing housing or hospitality locations. Each worker will need to be transported to and from housing locations each morning and evening. Each project should set a reasonable distance within which all workers would either come from their permanent residences or would be housed in project related temporary housing. This distance should then be applied to each worker-day required for construction and operation of the project.

- Borrow Areas: Some larger projects may choose to develop soil and rock borrow areas as part of the project. In these cases, the emissions attributable to mining equipment and

operations should be included in the emissions inventory. If soil and rock borrow are purchased from a private source, mining and processing emissions need not be included.

- Land Use and Land Cover Changes: Land use and land cover changes may substantially alter the rate at which GHGs are sequestered from the atmosphere or released to it (carbon flux). Quantifying the net change in carbon flux attributable to project implementation would require the measurement of carbon flux under 'no project' conditions and estimation of carbon flux under with project conditions. Both of these quantities involve substantial scientific uncertainty. In some cases, the loss of carbon sequestering flora displaced by the project will be replaced elsewhere as part of habitat mitigation measures, possibly offsetting the loss of carbon sequestration capacity. This topic is likely to gain importance as our understanding of carbon flux from specific land use activities increases.

On-going/operational and maintenance emissions

Operational and maintenance (O&M) emissions may vary widely among projects—from little or no O&M emissions from a levee project—to very large emissions from a pumping plant project. Some restoration and retrofit projects may even have net negative emissions if the project promotes natural processes that sequester GHGs or improves operational efficiency [or encourages water conservation]. For some projects electricity purchases will be the largest source of operational emissions, but projects should consider other potential sources of O&M emissions attributable to the project.

For purchased electricity, the WRI/CCAR protocol provides the easiest and most reliable method for converting Megawatt-hours (MWh) of electricity consumed to GHG emissions. WRI has developed a calculation tool specifically for this purpose. The tool uses a grid averaged conversion factor appropriate for electricity use throughout each region of the United States. Projects that have specific electricity supply contracts and can more accurately track where their electricity is being generated should consider using more precise emissions factors.

Projects that improve energy efficiency or alter the peaking demand for electricity should attempt to model how their operations are improvements over the baseline conditions. Reduced overall electricity demand or reduced electricity demand during peak demand periods can reduce overall GHG emissions.

Significance Criteria and Mitigation

Once the emissions from a proposed project have been accounted for, the CEQA lead agency must assess the impacts of these emissions and make a significance determination. This area of climate change analysis is developing and changing rapidly. New guidance and case law are constantly influencing the state of the practice. This section outlines the issues with respect to significance criteria and thresholds and outlines DWR's current strategy for determining the significance of GHG emissions, which lead agencies may use or adapt to their own projects.

CEQA defines a significant effect on the environment as a "substantial, or potentially substantial, adverse change in the environment" (Pub. Resources Code, § 21068) and "the determination of whether a project may have a significant effect on the environment calls for careful judgment on the part of the public agency involved, based to the extent possible on scientific and factual data." (CEQA Guidelines, §15064, subd. (b).)

The emissions from one project, even a very large project, are miniscule in comparison to worldwide or even statewide GHG emissions. However, DWR has concluded that the emissions from each project have an incremental contribution to the buildup of GHGs in the atmosphere and may have a significant environmental impact when analyzed on a cumulative basis. Cumulative impacts are those resulting from the incremental impact of the project when added to other past, present, and reasonably foreseeable probable future projects. (CEQA Guidelines, §15355, subd. (b).) Therefore, DWR has concluded that analysis of the significance of GHG emissions should typically be done as a cumulative impacts analysis. (CEQA Guideline, §15130, subd. (f).)

Determining whether the GHG emissions from a project contribute to a significant cumulative impact is complex and evolving. However, a determination of "less than significant" for cumulative impacts based on a finding that a project's contribution to the cumulative impact of GHG concentrations in the atmosphere is minute has not withstood legal challenge. Miniscule incremental impacts cannot be ignored as *de minimis* (*Communities for a Better Environment v. California Resources Agency* (2002) 103 Cal.App.4th 98, 117) nor can the incremental contribution to an environmental impact of a project be trivialized because of the extent to which previous projects have impacted the environment. *(Kings County Farm Bureau v. City of Hanford* (1990) 221 Cal.App.3d 692, 719.)

The CEQA Guidelines state that a threshold of significance may be a quantitative, qualitative, or based on performance level of a particular environmental effect above which impacts will normally be considered significant. (CEQA Guidelines, §15064.7, subd. (a).) A number of published documents provide a range of strategy guidance for determining thresholds of significance for GHG emissions. These advisory documents come from consulting firms specializing in CEQA work, professional associations, environmental organizations, and the Governor's Office of Planning and Research (OPR). (See Appendix B for a list and links to several of these documents.)

Three basic strategies for determining a quantitative threshold have been outlined in the technical guidance documents published to date : 1) Establish a significance threshold of net-zero (any increase over baseline conditions is significant); 2) establish a non-zero significance threshold based on compliance with AB 32 or other established GHG reduction strategies; or 3) decline to determine significance. Each of these three potential strategies all have complicating issues associated with them.

<u>Establishing a significance threshold of net-zero:</u>
Establishing a threshold of net-zero is the most conservative approach but may be likely to require almost all projects—even very small ones that may otherwise be exempt, or that would

otherwise only require a negative declaration—to produce full EIRs, which would considerably increase the time and cost of CEQA compliance.

Establishing a non-zero threshold:
A non-zero threshold presents the difficult question of what amount of GHG emissions are less than significant and what substantial evidence can be used to support this level of emissions. In June 2008, guidance published by OPR recognized the lack of established statewide thresholds of significance for GHG emissions and stated that each CEQA lead agency should establish its own approach to analyzing climate change from projects that generate GHG emissions. At the same time, OPR asked CARB to recommend a method for setting quantitative thresholds of significance for GHGs that would encourage consistency in CEQA analyses. This effort resulted in a draft proposal in December 2008. The draft proposal elicited a wide range of comments that questioned the underlying assumptions made by CARB. As of July 2010, CARB efforts to develop statewide guidance on setting thresholds of significance are on hold. CARB's difficulty in establishing a defensible methodology highlights the complexity of defining a non-zero level of significance.

Declining to determine significance:
Reporting emissions but declining to determine significance was used in a number of analyses in the past, but is now generally considered unacceptable in most circumstances because of the evolution of knowledge in this area. CEQA Guidelines, section §15064.4 further limits the circumstances under which a project could decline to determine significance. Additionally, recent case law makes it clear that GHG impacts are not too speculative to make a significance determination.

Developing Non-Zero Significance Thresholds

As discussed above, non-zero significance thresholds must identify quantitative, qualitative, or performance levels of GHG emissions below which the environmental effects would be considered less than significant. Substantial evidence must be used to support the threshold (CEQA Guidelines, §15064.7, subd. (c).) Answers to the following questions can be used to help lead agencies develop significance thresholds for GHG emissions for their projects:

- Does the project implement or fund its share of a mitigation strategy designed to alleviate climate change? This might be achieved through consistency with AB 32 and the Climate Change Scoping Plan (Scoping Plan) adopted by CARB.
- How and in what ways does the project move California toward a lower carbon future?
- How closely does the project's overall GHG emissions balance approach zero?
- Are there process improvements or efficiencies gained by implementing the project?
- Is the project inherently energy efficient?

In addition, some project proponents may also find it useful to discuss how the project contributes to delivering the vital services with the lowest possible GHG emissions.

The CEQA Guidelines state that a cumulative impact may be considered less than significant if the project implements or funds its fair share of a mitigation strategy designed to alleviate the

cumulative impact. (CEQA Guidelines, §15130, subd. (a)(3).) The Global Warming Solutions Act of 2006 (AB 32) is the definitive state law governing the reduction of GHG emissions. Consistency with AB 32 may meet CEQA Guidelines Section 15130, subd. (a)(3), allowing projects to claim their emissions are less than significant if the project is consistent with the implementation strategies and legislative intent of AB 32.

AB 32 sets aggressive goals aimed at reducing statewide emissions to 1990 levels by 2020 and in the process is leading the country and the world forward toward a lower GHG future. CARB finalized its Scoping Plan for implementation of AB 32 in December 2008. Full implementation of the plan is mandated to take place by January 2012.

The Scoping Plan lays out ***six key elements designed to meet the goals of the legislation***:

- Expanding and strengthening existing energy efficiency programs as well as building and appliance standards
- Achieving a statewide renewable energy mix of 33 percent
- Developing a California cap-and-trade program that links with other Western Climate Initiative partner programs to create a regional market system
- Establishing targets for transportation-related greenhouse gas emissions for regions throughout California, and pursuing policies and incentives to achieve those targets
- Adopting and implementing measures pursuant to existing State laws and policies, including California's clean car standards, goods movement measures, and the Low Carbon Fuel Standard
- Creating targeted fees, including a public goods charge on water use, fees on high global warming potential gases, and a fee to fund the administrative costs of the State's long term commitment to AB 32 implementation

Each of these elements is developed further with specific strategies for implementation. Water sector greenhouse gas reduction strategies are particularly relevant for IRWM practitioners. Moving, treating and using water more efficiently can result in substantial energy savings, and thus reduced greenhouse gas production, on a statewide level. Recommended measures in the plan for the water sector include:

- Water use efficiency
- Water recycling
- Water system energy efficiency
- Reuse urban runoff
- Increase renewable energy production
- Public goods charge

Project proponents are encouraged to consider how to incorporate these water sector strategies into their IRWM plans and selected projects in order to be consistent with AB 32 and the Scoping Plan. Whatever threshold of significance is established, projects should attempt to minimize GHG emissions in all phases of the project.

Conclusion

Reduction of GHG emissions should be achieved by implementation of all technologically feasible and cost-effective measures. These measures may differ from project to project, however, a number of measures have been proposed by the AG's Office, CARB, and others. Appendix C contains a list of mitigation measures that may apply to proposed projects.

DWR is committed to working toward reducing GHG emissions in California and achieving the goals set out in AB 32. As a CEQA responsible agency, DWR will review CEQA documentation on proposed projects for all environmental effects, including GHG emissions and will reach independent findings with respect to any significant environmental effects from GHG emissions.

Appendix B. Technical guidance documents for analyzing greenhouse gas emissions for CEQA

Association of Environmental Professionals. 2007. *Alternative Approaches to Analyzing Greenhouse Gas Emissions and Global Climate Change in CEQA Documents.* http://www.counties.org/images/public/Advocacy/ag_natres/AEP_Global_Climate_Change_June_29_Final%5B1%5D.pdf

California Air Pollution Control Officer Association. 2008. *CEQA and Climate Change Evaluating and Addressing Greenhouse Gas Emissions from Projects Subject to the California Environmental Quality Act.*

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California Office of Planning and Research. 2008. *Technical Advisory- CEQA and Climate Change: Addressing Climate change Through California Environmental Quality Act Review.* http://www.opr.ca.gov/ceqa/pdfs/june08-ceqa.pdf

Center for Biological Diversity. 2007. *The California Environmental Quality Act On the Front Lines of California's Fight Against Global Warming.* http://www.biologicaldiversity.org/publications/papers/CBD-CEQA-white-paper.pdf

ICF Jones and Stokes. 2007. *Addressing Climate Change in NEPA and CEQA Documents.* http://www.climatechangefocusgroup.com/docs/JonesAndStokesClimateChangeCeqaNepa_Aug_2007.pdf

Schussman, Barbara; Pradhan, Manu; and Marciniak, Sean (Bingham McCuthchen). 2008. NEPA Review and Impacts on Climate Change. CLE International, 4th Annual NEPA Super Conference, March 6 and 7, 2008, San Francisco. http://www.bingham.com/Media.aspx?MediaId=6641

United States Environmental Protection Agency. 2009. *Inventory of U.S. Greenhouse Gas Emissions and Sinks 1990-2007.* *http://epa.gov/climatechange/emissions/downloads09/InventoryUSGhG1990-2007.pdf*

World Resources Institute and World Business Council For Sustainable Development. N.d. *The Greenhouse Gas Protocol for Project Accounting.* *http://www.ghgprotocol.org/files/ghg_project_protocol.pdf*

Appendix C. Selected mitigation measures proposed by the Attorney General's Office and California Air Resources Board

Mitigation measures proposed by the Attorney General's Office (complete document available at: http://ag.ca.gov/globalwarming/pdf/GW_mitigation_measures.pdf)

Efficiency

1. Design buildings to be energy efficient. Site buildings to take advantage of shade, prevailing winds, landscaping and sun screens to reduce energy use.
2. Install efficient lighting and lighting control systems. Use daylight as an integral part of lighting systems in buildings.
3. Install light colored "cool" roofs, cool pavements, and strategically placed shade trees.
4. Install energy efficient heating and cooling systems, appliances and equipment, and control systems.
5. Install light emitting diodes (LEDs) for street and other outdoor lighting.
6. Limit the hours of operation of outdoor lighting.
7. Provide education on energy efficiency.

Renewable Energy

1. Install solar and wind power systems and energy-efficient heating ventilation and air conditioning.
2. Install solar panels over parking areas.
3. Use combined heat and power in appropriate applications.

Water Conservation and Efficiency

1. Create water-efficient landscapes.
2. Install water-efficient irrigation systems and devices, such as soil moisture-based irrigation controls.
3. Use reclaimed water for landscape irrigation. Install the infrastructure to deliver and use reclaimed water.
4. Design buildings to be water-efficient. Install water-efficient fixtures and appliances.
5. Restrict watering methods (*e.g.*, prohibit systems that apply water to non-vegetated surfaces) and control runoff.
6. Restrict the use of water for cleaning outdoor surfaces and vehicles.
7. Implement low-impact development practices that maintain the existing hydrologic character of the site to manage storm water and protect the environment. (Retaining storm water runoff on-site can drastically reduce the need for energy-intensive imported water at the site.)[15]
8. Devise a comprehensive water conservation strategy appropriate for the project and location. The strategy may include many of the specific items listed above, plus other innovative measures that are appropriate to the specific project.
9. Provide education about water conservation.

Solid Waste Measures

1. Reuse and recycle construction and demolition waste (including, but not limited to, soil, vegetation, concrete, lumber, metal, and cardboard).
2. Provide interior and exterior storage areas for recyclables and green waste and adequate recycling containers located in public areas.
3. Recover by-product methane to generate electricity.

Transportation and Motor Vehicles

1. Limit idling time for commercial vehicles, including delivery and construction vehicles.
2. Use low or zero-emission vehicles, including construction vehicles.
3. Promote ride sharing programs *e.g.*, by designating a certain percentage of parking spaces for ride sharing vehicles, designating adequate passenger loading and unloading and waiting areas for ride sharing vehicles, and providing a web site or message board for coordinating rides.
4. Create car sharing programs. Accommodations for such programs include providing parking spaces for the car share vehicles at convenient locations accessible by public transportation.
5. Create local "light vehicle" networks, such as neighborhood electric vehicle (NEV) systems.
6. Provide the necessary facilities and infrastructure to encourage the use of low or zero-emission vehicles (*e.g.*, electric vehicle charging facilities and conveniently located alternative fueling stations).
7. Increase the cost of driving and parking private vehicles by, *e.g.*, imposing tolls and parking fees.
8. Provide shuttle service to public transit/[work sites].
9. Provide information on all options for individuals and businesses to reduce transportation-related emissions.

Carbon Offsets

1. If, after analyzing and requiring all reasonable and feasible on-site mitigation measures for avoiding or reducing greenhouse gas-related impacts, the lead agency determines that additional mitigation is required, the agency may consider additional off-site mitigation. The project proponent could, for example, fund off-site mitigation projects (*e.g.*, alternative energy projects, or energy or water audits for existing projects) that will reduce carbon emissions, conduct an audit of its other existing operations and agree to retrofit, or purchase carbon "credits" from another entity that will undertake mitigation.

2. The topic of offsets can be complicated, and a full discussion is outside the scope of this summary document. Issues that the lead agency should consider include:

    - The location of the off-site mitigation. (If the off-site mitigation is far from the project, any additional, non-climate related benefits of the mitigation will be lost to the local community.)
    - Whether the emissions reductions from off-site mitigation can be quantified and verified.
    - Whether the mitigation ratio should be greater than 1:1 to reflect any uncertainty about the effectiveness of the offset.

Select Early Action Strategies Proposed by the California Air Resources Board (More information available at: http://www.arb.ca.gov/cc/ccea/ccea.htm)

SmartWay Truck Efficiency
The strategy involves requiring existing trucks/trailers to be retrofitted with the best available "SmartWay Transport" and/or ARB approved technology. Technologies that reduce GHG emissions from trucks may include devices that reduce aerodynamic drag and rolling resistance. Aerodynamic drag may be reduced using devices such as cab roof fairings, cab side gap fairings, cab side skirts, and on the trailer side, trailer side skirts, gap fairings, and trailer tail. Rolling resistance may be reduced using single wide tires or low-rolling resistance tires and automatic tire inflation systems on both the tractor and the trailer.

Tire Inflation Program
The strategy involves actions to ensure that vehicle tire pressure is maintained to manufacturer specifications. Specifically, the strategy seeks to ensure that tire pressure in older vehicles is monitored by requiring that tires be checked and inflated at regular service intervals. One potential approach would be to require all vehicle service facilities, such as dealerships, maintenance garages, and Smog Check stations, to check and properly inflate tires. It is also anticipated that signage at fueling stations clearly indicate the availability of compressed air at no charge. Staff also recommends that the feasibility of conducting an extensive outreach program be investigated.

Blended Cements
The strategy to reduce CO2 emissions involves the addition of blending materials such as limestone, fly ash, natural pozzolan and/or slag to replace some of the clinker in the production of Portland cement. Currently, ASTM cement specifications allow for replacement of up to 5% clinker with limestone. Most manufacturers could in fact replace up to 4% with limestone. Caltrans allows for 2.5% average limestone replacement until testing of the long term performance of the concrete is complete. Caltrans currently has over $1 million in task orders and is devoting considerable staff resources to the evaluation of limestone blending in cement. Caltrans also currently has standards for using flyash and slag in concrete. Other blending practices will be explored.

Anti-idling Enforcement
The strategy guarantees emission reductions as claimed by increasing compliance with anti-idling rules, thereby reducing the amount of fuel burned through unnecessary idling. Measures may include enhanced field enforcement of anti-idling regulations, increased penalties for violations of anti-idling regulations, and restriction on registrations of heavy-duty diesel vehicles with uncorrected idling violations.